R E M A R K S

This paper is responsive to an Official Action that was received in this case on October 28, 2005. In that Action, all pending claims (claims 1-30) were rejected as follows:

- Claims 18, 19, 24, and 25 were rejected under 35 USC §112, ¶2 as being indefinite.
- Claims 27-29 were rejected under 35 USC §102 as being anticipated by USP 6,799,047 to Bahl *et al.*
- Claims 1, 2, 7-10, and 13-14 were rejected under 35 USC §103 as being obvious over Bahl *et al.* in view of USP 6,850,946 to Rappaport *et al.*
- Claims 4-6, 12, 15, and 20-21 were rejected under 35 USC §103 as being obvious over Bahl *et al.* in view of Rappaport *et al.* and further in view of USP 6,119,009 to Baranger *et al*.
- Claims 16-19, 22, and 24-26 were rejected under 35 USC §103 as being obvious over Bahl *et al.* in view of Rappaport *et al.* and further in view of Baranger *et al*. and an article by Egbert *et al.*
- Claims 3, 11, and 23 were rejected under 35 USC §103 as being obvious over Bahl *et al.* in view of Rappaport *et al.* and further in view of an article by Bahl *et al.*

Responsive to the Action, claims 15, 17, 18, 21, 23, 24, and 27 have been amended and claims 16, 22, and 30 have been canceled. Reconsideration is respectfully requested in view of the foregoing amendments and the following remarks.

Rejections Under 35 USC §112, ¶ 2

The Office rejected claims 18 and 24 stating that "estimation of signal vector is missing from the specification." This process, which is no more complicated than what is recited in claim, is described in the specification at paragraph [0085]. The process of estimating a signal vector is nothing more than simply assigning a compass heading to the direction of a transmitter from a given raster.

The Office rejected claims 19 and 25 stating that "the recitation of a difference between said surface vector and said signal vector" is not consistent with what is disclosed in the specification at paragraph [0087].

Claims 19 and 25 relate to the determination of orientation-dependent signal loss. These claims recite signal attenuation further comprises determining a difference between the surface vector and the signal vector. This is, in fact, consistent with what has been described in the specification. The process of determining a difference between the surface vector and signal vector is explained at paragraph [0089] in conjunction with Figure 15. Once this difference is determined, the relative signal attenuation due to the angle of incidence of the signal (against the building exterior and interior walls) can be obtained. In fact, it is simply read from Table 1 at paragraph [0087].

In view of the foregoing clarifications, applicant requests that the Office withdraw the Section 112 rejections of claims 18, 19, 24, and 25.

Discussion of Applicant's Invention and the Cited Art

Applicant's claimed invention pertains to the direct use of a geo-referenced raster map of a building in an algorithm for locating users in a wireless network. In a raster map, which is also called a bitmap, an image is formed out of individual pixels that, when arranged in a rectangular form, indicate a recognizable image (*e.g.*, a building footprint). The main drawback of a raster map is that it is really a picture; no underlying intelligence is available from these maps.

An alternative to a raster map is a vector map. With a vector map there is no "image." Rather, an image is created on the fly using information from a database. The database consists of coordinates defining points and information on how to connect those points together to form lines and other objects. In addition, labels attached to the object can provide text to be displayed along with the object when an image is created.

Modeling RF propagation in and through buildings using a raster database is quite distinct from doing such modeling using a vector database. It is much more difficult to model using a raster database than a vector database.

In fact, the prior art does NOT model using a raster database. Rather, in the prior art, all modeling is done based on a vectorized database. That is, the raw building raster maps are not directly used in modeling.

In view of the preference for vector modeling, it is somewhat inconvenient that most building footprints are available in raster format, not vector format. In fact, this issue is

addressed by the Rappaport *et al.* patent. In particular, Rappaport *et al.* disclose a "Building Database Manipulator" or "BDM," which is a helper software program. The purpose of the program is to assist a human operator with the transfer of architectural data, in rasterized form or otherwise, to a form that is better suited for modeling — the vectorized form. *See*, *e.g.*, Rappaport *et al.* at col. 8, lines 12-37 and col. 10, lines 12-34:

> Raster drawings or maps are collections of individually colored points that, when viewed as a whole, form a picture representation of the environment…. A raster image or map references the pixels in a specific grid rather than vectors. Therefore, raster images do not contain detailed information about objects.
>
> The present invention allows raster images to be copied …. Raster drawings of any type may be converted into vector drawings, or other vector data based representations.
>
> Vector drawings are collections of individual lines and polygons. Because vector drawings consist of lines and polygons, converting them into a format used by the present invention is straightforward.
>
> The present invention utilizes the vector information of imported maps … to build complex 3-D representations and vector based databases.

(Emphasis added.)

Thus, even though Rappaport *et al.* **accept** a rasterized map, in recognition of their widespread availability, as data input, their process for RF modeling in and through building is NOT raster-based. Simply put, the Rappaport *et al.* BDM converts the raster map to vector format, which is then used for modeling.

Regarding the other cited art, Bahl *et al.* does pertain to a wireless location method. But Bahl *et al.* has nothing to do with raster maps. Indeed, as disclosed in that patent, data (*e.g.*, a floor schematic) is input to the Cohen-Sutherland Line Clipping Algorithm.[1] This algorithm is for use with vectorized data, not rasterized data. Likewise, Baranger *et al.* uses a vector-based method; it has nothing to do with raster maps.

[1] "Clipping" refers to the removal of part of a scene. There is line clipping and polygon clipping. A line clipping algorithms takes as input two endpoints of line segment and returns one (or more) line segments. A polygon clipper takes as input the vertices of a polygon and returns one (or more) polygons. As its name implies Cohen-Sutherland is a "line" clipper.

Again, applicant's claimed invention is a raster-based method for RF modeling in and through buildings to determine the location of a wireless terminal. The prior art methods for RF modeling are vector based.

The Pending Claims
Are Allowable
Over the Cited Art

Turning now to the claim language, claim 1 recites a method for estimating a location of a wireless terminal, wherein the method comprises, in pertinent part:

> defining a rasterized footprint of a building…; and
>
> estimating signal attenuation due to said building, wherein the estimate of signal attenuation is based on signal losses at a first group of said rasters, wherein said rasters in said first group define said boundary of said rasterized footprint.

Neither Bahl *et al.,* Rappaport *et al.*, or Baranger *et al.*, alone or in combination, disclose or suggest what is recited in claim 1. In particular, these references provide no teaching or suggestion to estimate signal attenuation based on signal losses at a first group of rasters at a boundary of the rasterized footprint.

As a consequence, claim 1, and claims 2-9 dependent thereon, are allowable over these references. The recitation of additional patentable features in dependent claims 2-9 provide a secondary basis for the patentability of those claims.

Claim 10 recites a method for estimating a location of a wireless terminal, wherein the method comprises, in pertinent part:

> defining a rasterized footprint of a building…; and
>
> estimating signal attenuation due to said building, wherein the estimate of signal attenuation is based on signal losses in a second group of said rasters, wherein said rasters in said second group are in said interior of said rasterized footprint.

Neither Bahl *et al.,* Rappaport *et al.*, or Baranger *et al.*, alone or in combination, disclose or suggest what is recited in claim 10. In particular, these references provide no teaching or suggestion to estimate signal attenuation based on signal losses at a second group of rasters in the interior of the rasterized footprint.

As a consequence, claim 10, and claims 11-14 dependent thereon, are allowable over these references. The recitation of additional patentable features in dependent claims 11-14 provide a secondary basis for the patentability of those claims.

Amended claim 15 recites a method for estimating a location of a wireless terminal, wherein the method comprises, in pertinent part:

> defining a rasterized footprint of a building…; and
>
> estimating signal attenuation due to said building by estimating an angle of incidence of a signal with said building, wherein said signal is transmitted from a transmitter, and wherein estimating said angle of incidence with said building comprises estimating a surface vector of a raster at said boundary.

Neither Bahl *et al.,* Rappaport *et al.*, or Baranger *et al.*, alone or in combination, disclose or suggest what is recited in claim 15. In particular, these references provide no teaching or suggestion to estimate signal attenuation due to the building by estimating a surface vector of a raster at the boundary of the building.

As a consequence, claim 15, and claims 16-20 dependent thereon, are allowable over these references. The recitation of additional patentable features in dependent claims 16-20 provide a secondary basis for the patentability of those claims.

Amended claim 21 recites a method for estimating a location of a wireless terminal, wherein the method comprises, in pertinent part:

> defining a rasterized footprint of a building…; and
>
> estimating signal attenuation due to said building, … wherein estimating signal attenuation comprises estimating a surface vector of a raster within an interior of said raster footprint.

Neither Bahl *et al.,* Rappaport *et al.*, or Baranger *et al.*, alone or in combination, disclose or suggest what is recited in claim 21. In particular, these references provide no teaching or suggestion to estimate signal attenuation by estimating a surface vector of a raster within an interior or the raster footprint.

As a consequence, claim 21, and claims 22-26 dependent thereon, are allowable over these references. The recitation of additional patentable features in dependent claims 22-26 provide a secondary basis for the patentability of those claims.

Amended claim 27 recites a method for estimating a location of a wireless terminal, wherein the method comprises, in pertinent part:

> accessing an outdoor radio frequency database…; and
>
> modifying said signal strength, as provided by said outdoor radio frequency database, with signal-attenuation values from an indoor radio frequency database, wherein said indoor radio frequency database provides signal attenuation, as determined by a raster map of said structure, as a function of location within a structure.

Neither Bahl *et al.,* Rappaport *et al.*, or Baranger *et al.*, alone or in combination, disclose or suggest what is recited in claim 27. In particular, these references provide no teaching or suggestion to modify signal strength, as provided by an outdoor rf database, with signal-attenuation values from an indoor rf database, wherein the signal attenuation values of the indoor rf database are determined via a raster map.

As a consequence, claim 27, and claims 288-29 dependent thereon, are allowable over these references. The recitation of additional patentable features in dependent claims 28-29 provide a secondary basis for the patentability of those claims.

The Office also relied on articles by Egbert *et al.* and Bahl *et al.* for the rejections of certain dependent claims. In particular, the Office alleged that Egbert *et al.* teaches a method of estimating a surface vector of a raster at a boundary and, in conjunction with Bahl *et al.*, Rappaport *et al.*, and Baranger *et al.*, rejected claims 16, 17, 22, and 26 on that basis.

Egbert *et al*. pertains to a technique for collision-free movement using vector fields. The technique recursively subdivides a volume surrounding an object into octants (for, in 2d space, the area surrounding an object is divided into quads). In any case, a repulsive vector is then assigned to each node of the octant (quad). The direction of the force vector is normal to the object.

There are similarities in the way a surface vector is defined in applicant's invention and the way the force vectors are defined in Egbert *et al.* But there is no suggestion in

Egbert *et al.* or in any of the cited art to apply this vector technique to the estimation of signal attenuation in a wireless location system, as done by applicant.

With regard to the Bahl *et. al.* article, the Office stated that although the patent references do not disclose determining raster depth, the Bahl *et al.* does, and rejects claims 3, 11, and 23 on that basis. The Office references section 4.1.2 of the reference in support of the rejections.

The Bahl *et al.* disclosure at section 4.1.2 simply discusses a nearest neighbor technique whereby the coordinates of these neighbors are averaged. According to Bahl *et al.*, the error vector for each neighbor is oriented in a different direction such that averaging might yield an estimate that is closer to a user's true location than any individual neighbor.

This technique has nothing to do with determining raster depth, as recited in claims 3, 11, and 23.

Conclusion

It is believed that claims 1-15, 17-21, and 23-29 now presented for examination are in condition for allowance. As a consequence, a notice to that effect is solicited.

Should there remain unresolved issues the applicant respectfully requests that Examiner telephone the applicants' attorney at 732-578-0103 x12 so that those issues can be resolved as quickly as possible.

Respectfully,
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